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MANUFACTURE OF BRICK.—YELLOW DUTCH BRICK.

It may be remembered by our readers, that some time since we published some queries from a correspondent in relation to seasoning timber, and also to the manufacture of the yellow Dutch brick, formerly imported into this country, and of which we yet have specimens in some of our old buildings in New York. We republish as much of this communication as relates to the latter subject, having sometime since disposed of the former.

"What is the Dutch mode of making the little yellow bricks of which the oldest houses of our city are composed? Is their color owing to the kind of clay used—the mode of burning them—or to both? Are they very much compressed in making, or to what cause is owing their great hardness and durability? Can bricks of such quality be made in this country, and what place furnishes clay of proper quality?

"I make these inquiries partly for obtaining information for my own use; and partly in the hope that they may lead others to think of the superiority of the Dutch brick, both as a matter of taste, as regards color, and of durability, (of both of which, I think, there is little room to doubt,) and thus promote the adoption of them in place of the crumbling, staring red bricks of which our cities are so generally built; and the chief qualities of which are, hardness to the eye, and softness under the mellowing hand of time.

Yours, D*** F****."

We agree with our correspondent fully in his preference of the color and other good qualities of the Dutch brick so much prized by our ancestors, and although a part of his query might easily have been answered we were induced to inquire more fully into the subject, and having much that was of interest as well as use, we could not easily condense the information obtained. We shall at present give some account of the mode of manufacture in Holland, and also show the importance of a more carefully conducted process than is usually followed in the formation of brick for hy-

dralic and other works intended to be more durable than common erections.

In the first place, the yellow brick of Holland is made from clay or mud scooped up from the bottom of the river Yssel, and probably from other rivers, or even ditches, through which a moderate current flows allowing of the deposition of this kind of sediment. This clay well tempered is moulded and burned in kilns adapted to the use of peat as a fuel. The peat employed gives out a clear flame of considerable volume, and leaves but little ashes. The heat is kept up for *three or four weeks and about three weeks more are allowed for the brick to cool* before being removed. Formerly, and we presume even yet, this branch of manufacture was subject to certain regulations which were well calculated to maintain the superiority of the bricks. For instance, the time of operation was limited to certain seasons in such a manner as to prevent the possibility of damage by frost in drying.

The harder burnt bricks, called klinker, are partially vitrified, and although not suitable for building, yet from their extreme hardness, are even yet imported into England for paving.

In addition to this, we find that the finer bricks used in and near London, and which are preferred on account of their greyish and more pleasing color, are made by adding a certain portion of *Thames sand*, and sometimes *bituminous coal ashes.* These bricks, although perhaps not so compact as those made in Holland, are yet durable and strong, yielding a clear ringing sound when struck.

From the above mentioned particulars, we conceive that the means are furnished for understanding the reason of the peculiar properties of these bricks, and for imitating them to any required extent in our own country, and from our own materials. The first thing to be ascertained, is the constitution of the river clay—the Thames sand appearing to impart analogous properties, and having a somewhat similar origin, may be considered at the same time. The most obvious advantage of clay found in such situations, is its superior fineness of grain, for course sand or gravel is a disadvantageous addition to brick clay. We have then a mechanical advantage sufficient to account for the homogenous structure of such bricks. In regard to the chemical composition we unexpectedly met with a case bearing directly upon this inquiry in Pasley's able work on Lime, Cements, etc. The information is so much to the purpose that we trust our readers will bear with us while we enter into detail. Col. Pasley found that an excellent cement might be made by mixing chalk with the *blue clay of the river Medway.* He also found that this clay after exposure to the air became, first on the outside, and finally throughout, of a brown color, and having tried the clay thus altered by exposure, by burning it with chalk precisely in the same manner and in the same proportions as before, he ascertained that it had lost its excellent qualities. This put him upon examining into the constitution of the clay and the nature of the gases given out by it in heat-

ing. The result of an analysis by Faraday was that one hundred grains gave—

	Water,	50.9
	Sand,	14.0
Finer particles,	Silica,	14.8
	Alumina,	10.8
	Peroxide of iron,	3.4
	Carbonate of lime,	1.5
	Fragments of wood,	1.5
	Organic matter,	3.1
		100.0

Faraday remarks that the iron, although estimated as peroxide exists partly as a sulphuret and partly as protoxide. The gases given out by heating were such as would result from the decomposition of organic matter and sulphuret of iron.

It was suggested to Col. Pasley that the iron might be changed to peroxide by exposure, and that the addition of some organic matter might restore the clay to its former properties, and such proved to be the case. In fact, the small quantity of wood, etc., in calcining the mixture did in a measure produce the same effect, although perhaps not to the extent required for his purpose.

Now to make the application of this to the manufacture of brick we must remark that iron in the state of peroxide, either wholly or partially, (as it is found after long exposure), is incapable of forming a fusible compound with the other materials in clay, and these materials without admixture are incapable of forming a compound of any tenacity unless very highly heated. But iron, in the state of protoxide forms an easily fusible compound with the other ingredients of clay, and the presence of a sufficient quantity of wood, coal, resin, or other organic matter, will determine the conversion of peroxide into protoxide of iron. The finer and more intimately this organic matter is mixed with the clay, the more certain will be its effects and the less injurious will it be to the sound and homogenous appearance of the brick. In the fine river clay of Holland we have all these conditions fulfilled—the earthy particles are in a state of great mechanical division and mingled with them is a quantity of organic matter as finely divided. A small proportion of iron is present and when burned this is all reduced to protoxide which unites with the other constituents of the clay and forms a sort of slag or semi-vitrification which gives to the brick a very close and even structure. The length of time allowed for the burning and cooling, and the nature of the fuel have all a great effect in perfecting the article.

The English mode of manufacture gives an approximation to the same result. The Thames sand, exceedingly fine, and charged slightly with vegetable matter, furnishes the same advantages of minute division and a

favorable condition of at least a part of the iron. The addition of bituminous coal ashes, which contain a portion of combustible matter, helps to reduce more of the iron, while the other portions of the ashes are in no wise injurious, as they furnish still more earthy matter in a finely divided state.

As a confirmation of the above mentioned hypothesis, we find that *paving tiles*, which are made of a very fine clay well wrought and which is less refractory than ordinary brick clay, are rather stronger than the best bricks. In Holland the material for these tiles is also procured from the alluvial earth of meadows or swampy grounds.

It is evident, then, that to perfect the manufacture of brick, we must pay particular attention to the quality of the earth used, and when this is not precisely such as we wish, to improve it by the addition of other substances. The mud of rivers, when it contains sufficient clay, is probably the best material, and when deficient in this ingredient, it will only be necessary to add a proper quantity of some other stiff clay of fine texture, and not containing any coarse gravel. In order to imitate the yellow Dutch brick, it will be found useful, when river clay cannot be procured, to add to the best material accessible, a quantity of finely divided combustible matter. The substance best answering this description will be the finest anthracite coal dust, and we believe this has been used with success. This addition gives a double advantage—the conditions above named are fulfilled, and the fuel is not only applied externally, but also is furnished within and throughout the substance of each brick. It is also likely that the application of coal tar, or some similar resinous matter, would have a beneficial effect, where none but ordinary clay could be procured. The mud accumulated in the slips of our large cities could hardly be put to a better use than in brick making. It must be recollected that the presence of salt in quantities, is supposed to be injurious to brick clay. In the use of such mud or clay this must not be forgotten.

The experiments of Col. Pasley furnished us with some excellent trials of the strength of brick of various qualities compared with other building materials. In testing the cohesive power of the best cements he found that with bricks of good or even superior quality, the fracture in nearly half of the trials took place in the brick, and not in the joint. With inferior brick it was found impossible to carry on the experiment, as the cement proved the strongest. His testimony as to the cause of the inferiority of the bricks is so much to the purpose that we give it in his own words. "The weakest bricks now alluded to were *marle* brick of the very same earth as the strongest of the bricks that we had experimented upon before, made in the same field and under the superintendance of the same master brick maker. On examining the fractures of these weak brick it appeared that the ingredients, namely, brick earth with a small proportion of chalk to color it had not been so well mixed as in the others, for small white lumps of imperfectly ground chalk, were visible in many parts. This defect,

which was scarcely perceptible in the fractured parts of the strong bricks, cannot be discovered by merely examining the article."

We shall conclude with a table compiled from Col. Pasley's experiments, in which the vast range of the resistance of bricks cannot but be remarked. For the sake of comparison we add the strength of several other substances used in building, tried by him.

The prisms experimented upon were two inches square and four inches long, and were broken down by the application of a knife edge (from which a scale board was suspended) to the middle of their length. The average cohesiveness is deduced from the experiments in which the bricks were subjected to a tearing action in trying the different cements.

Description.	Weight of prisms in Troy grains.	Weight per cubic foot in lbs.	Breaking weight in lbs. in several successive experiments.			Average resistance in lbs.	Average cohesiveness in lbs.
Kentish rag	10739	165.69	4286	3817	5099	4581	3773
Yorkshire stone,	9571	147.67	2976	2500	3185	2887	3642
Cornish granite,	11164	172.24	3179	2801	2445	2808	3841
Portland,	9598	148.08	2195	2892	2958	2682	4004
Bath,	7945	122.58	708	694	596	666	1408
Plain tiles,	7154	110.38	1006	1658	764	1166	
			1189	1225			
Paving tiles,	7308	112.75	1148	988	1073	1124	
			1225	1188			
†Superior, bricks,	5944	91.71	704	795	617	752	3007
			955	622	640		
			722	706	823		
†Inferior bricks,			204	262	522	329	1105
Pure chalk, (dry)	6157	94.99	414	265	314	334	473
An excellent artificial cement,	Days old. 14	87.	560	468	442	490	1337*
Another,	15	83.	388	365	325	370	1453*
			387	383			
Sheerness cement,	15	104.	489	641	599	580	1220*

From the above experiments it appears that the *resistance* of various stones etc., in opposition to a breaking force, is not in proportion to their specific gravity, nor in any direct proportion to their *cohesiveness* in opposition to a tearing force.

For the American Railroad Journal and Mechanics' Magazine.

REMARKS ON THE "LAWS OF TRADE." By C. Ellet, Jr., *Civil Engineer.*

No. 2.

It was demonstrated in the article published in the preceeding number of the Journal, that the aggregate revenue of an improvement, derived from commodities of heavy burden of which the distribution is uniform, would be expressed by

* Adhesiveness to Portland stone. † These bricks were not of inferior quality as commonly denominated, but were all selected from the best made. The inferiority and superiority refer solely to strength.

$$R=\frac{t\Pi^3 c}{3\beta(\delta+c)^2}; \qquad (A)$$

and that when this quantity is a maximum c must be equal to δ, or the charge for toll must be equal to the charge for freight.

If we now make this substitution of δ for c, in equation (A,) we shall obtain directly for the value of the maximum revenue,

$$R=\frac{1}{12}\frac{t\Pi^3}{\beta\delta}. \qquad (B)$$

The tonnage due to the charge δ for toll, and the conditions imposed in the investigation, will be

$$T=\frac{1}{2}\frac{t\Pi^2}{\beta\delta}. \qquad (C)$$

By inspecting these two equations we will perceive that the *revenue* is directly proportional to the productiveness of the country, and to *the cube of the charge for carriage which the commodity will bear;* and that it is reciprocally proportional to the charge for freight on the line and on the lateral roads leading to and from it: while the *tonnage* is directly proportional to the productiveness of the country, and *the square of the charge which the commodity will bear*, and reciprocally as the cost of conveyance on the line and on its lateral branches.

We may form some estimate from these facts, of the influence exercised on the tonnage and revenue of public improvements by changes in the market value of the commodities carried upon them. If, for instance, they should penetrate a corn-growing district, where the value of corn in market exceeds the cost of its production, for any given year, 10 cents per bushel; and while the quantity raised per acre, and the cost of producing it, remain the same, the market value for the next year be increased 10 cents per bushel, then by equations (B) and (C), *the revenue will be increased eight fold and the tonnage four fold.*

Again, by comparing the preceeding expressions for the tonnage and revenue, we obtain the new equation

$$R=\frac{\Pi T}{6}; \qquad (D)$$

or, when the toll is properly assessed, the revenue derived from any commodity of which the distribution is uniform will be found *by multiplying the whole number of tons transported on the line; by the sixth part of the difference between the market value and cost of production of one ton.*

The difficulty of making correct estimates of the prospective revenue of a projected improvement is fully appreciated; but if the aggregate tonnage, and the charges which the objects expected to be conveyed will respectively bear, be first correctly assumed, the application of the formula will not mislead in the determination of the revenue. It is the practice of the patrons of new lines to fortify their arguments by such estimates both of the future tonnage and resources of their favorite schemes; and in such cases the formula may be used as a convenient test of the accuracy of their

conclusions. Let us suppose, for example, that we correctly estimate the wheat or corn that will pass along the work at 100,000 bushels; and that we know by experience that this article will bear a charge for carriage, to and along the line, of 30 cents per bushel. Then, by the equation, the revenue will be 500,000 cents, or five thousand dollars—and any estimate exceeding this sum should be viewed with distrust.

It is important to be able to anticipate what effect will be produced on the trade and profits of an improvement by deviating from the charge which we have ascertained to be that which will produce the highest dividend. It will be readily observed from the foregoing investigation, that if we exact a greater toll than the charge for freight, both the revenue and tonnage will be at once reduced; so that our solution furnishes a limit which must never be exceeded in assessing the toll on the class of commodities now under consideration. But, while it is very apparent that the charge can never exceed the value of the freight, without involving a loss of revenue, it is equally apparent that if it be less than the freight there will be some compensation for the diminished revenue in the augmented tonnage—and it might happen that the increased tonnage would be worth more than the revenue sacrificed to obtain it.

To determine this point, and ascertain the effect of such reduction, let us suppose that instead of a toll just equal to the freight, we establish for the charge but half that amount. In this case $c=\frac{\delta}{2}$; which value of c being substituted in equation (A) gives

$$R'=\frac{2}{27}\frac{t\,\Pi^3}{\beta\,\delta},$$

for the revenue due to the reduced charge. This value, compared with the maximum revenue, in equation (B), teaches us that by reducing the toll one half we suffer a loss of revenue of but 11 per cent.

The tonnage under the reduced charge will be expressed by

$$T'=\frac{2}{3}\frac{t\,\Pi^2}{\beta\,\delta};$$

which, compared with equation (C), shows that while a reduction of the toll of 50 per cent. reduces the revenue but 11 per cent. the tonnage is augmented by it 33 per cent.

Now, it will be remembered, that the tonnage is here regarded as proportional to the area of the country by which it is supplied; and therefore, in estimating the increase of trade consequent on any reduction of the charges, we estimate only that portion which is due to the increased area of country drained by the work; while the increased quantity furnished by a given area in consequence of the increase of the profits of the producer, are not reached by the computation.

That an augmentation of price will have the effect of increasing the exports from a given area, more or less, cannot be doubted; and we are therefore to regard 33 per cent. as the minimum limit of the increase of

freight to be anticipated from the assumed reduction of the toll, and 11 per cent. as the maximum limit of the simultaneous diminution of the revenue —limits which will never be attained. We are justified, therefore, in coming to the conclusion that *by reducing the toll one half, the freight will be increased more than one-third, and the revenue will be reduced less than one-ninth, of their previous values.* In fact the augmentation of the tonnage will be very important, and the loss in tolls, scarcely, if at all, perceptible. We may conclude from these facts, how very essential it is, where an uniform charge is adopted—a practice, however, which cannot be too highly deprecated—to make that charge on all commodities which escape the competition of rival works, exceedingly low. On long canals, where the average freight will be about 12 mills per ton per mile, the charges on nearly all the produce of the mines, fields and forests ought not to exceed 6, or at most 7 mills.

To the Editors of the American Railroad Journal and Mechanics' Magazine.

GENTLEMEN:—In looking over your valuable Journal of Sept. 1st 1840, page 154, this morning, we noticed for the first time, the following "we find it recorded that one of Mr. Norris' engines drew over the Philadelphia and Reading road, 54 miles, at the rate of ten miles per hoar, 101 cars, containing a nett load of 323 tons exclusive of cars and tender." As but in one instance has there been a train of 101 cars drawn over the road above mentioned, we think your statement ment to refer to an engine made by us, for the Philadelphia and Reading railroad Co., which in February last, drew over the road just mentioned a train of 101 loaded cars; the gross weight being 423 tons, of 2240 lbs. not including engine or tender; the nett weight of freight being 268½ tons, of 2240 lbs. This is much the largest load that has ever been conveyed over the Philadelphia and Reading road by a single engine, and when the weight of the engine is taken into consideration, being but 24,660 lbs. whole weight in running order, with full complement of fuel (anthracite) and water; on driving wheels 18,260 lbs. The performance may be looked upon as extraordinary.

Enclosed we send you the statement of Mr. G. N. Nicolls, furnished for publication in the Jour. Frank. Inst., at the time the above load was drawn, which gives a detailed account of the performance, which we respectfully ask you to insert, in connection with what we have written above.

Very respectfully,

EASTWICK & HARRISON.

Philadelphia, Nov. 2d, 1840.

STATEMENT OF THE PERFORMANCE OF THE LOCOMOTIVE ENGINE "GOWAN AND MARX," BUILT BY MESSRS. EASTWICK AND HARRISON, PHILADELPHIA, ON THE PHILADELPHIA AND READING RAILROAD, WITH A TRAIN OF ONE HUNDRED AND ONE LOADED CARS. FEBRUARY 20th, 1840.

Gross weight of train, including cars and freight, but not including engine or tender, 423 tons of 2240 lbs.

Net weight of freight, 268½ tons of 2240 lbs.

The freight consisted of—2002 barrels of flour, 82 do. whiskey, 459 kegs of nails, 19 tons bar iron, 22 hhds. meal, 5 do. whiskey, 4 do oil, and sundry other articles, making a total of 268½ tons.

Distance from Reading to the foot of the inclined plane on the Columbia railroad, 54½ miles. Running time of the engine with train, five hours thirty-three minutes; rate 9.82 miles per hour. Coal consumed, red ash anthracite, from Schuylkill county, 5600 lbs. Water evaporated, 2774 gallons.

Grades of road.—The total fall from Reading to the point where the train was stopped near the Columbia railroad, is 214.5 feet, being an average fall of 3.94 feet per mile. There is *no ascending grade* from Reading to the Columbia railroad, with the exception of about 2100 feet at its lower termination, graded at 26.4 feet per mile, upon which grade the train was stopped; the other grades vary from 19 to 15 feet per mile; there are only three miles graded at 18 feet and one at 19 feet per mile.

The total length of *dead level* line from Reading to the Columbia railroad is 27 miles and 4200 feet; of this the longest level is 9 miles and 500 feet long, between Norristown and the inclined plane; the others vary from 1550 to 4 miles and 1600 feet in length.

State of the track.—Owing to the frost coming out of the ground at this season, the track was in worse order than at any other time of the year; this, however, did not materially affect the performance of the engine, as the embankments were all in nearly as good order as at other times; and at comparatively few points in the deep cut, was the track sufficiently out of line or level to offer increased resistance to the train.

The superstructure of the road consists of a T rail, 45 lbs. to the yard, laid upon sills 7 feet long and 7 by 8 inches square, 3 feet 1½ inches apart from centre to centre, and laid on broken stone.

State of the rails.—For the first twenty miles the rails were in very bad order, the morning was cloudy, and a fog of the previous night had left sufficient moisture on the surface of the rails to diminish considerably the adhesion of the engine; for the remainder of the distance the weather was clear, and the rails in good order.

Working of the engine.—On three different occasions the engine started the whole train on a dead level, and when on a dry rail, without the wheels slipping.

The steam ranged from 80 lbs. to 130 lbs. per square inch, to which latter pressure the safety valve was screwed down.

The draught of the engine was created by the escape steam passing into, and from, a tubed exhaust box—no other draught was used while running; at the water stations, "Reilly's patent fan" was used when fresh coal was thrown on the fire, but at no other time.

The speed of the train was noted when passing through some curves of 819 feet radius on the 9 mile level, and found to be 9.8 miles per hour; on a straight line on the same level, the engine attained a speed of 10.5 miles per hour.

So little was the engine affected by her performance on the 20th, that on the 23d she drew, on her return trip, 88 burden cars, 9 of which were loaded, and a locomotive engine, making a gross weight of 163 tons of 2240 lbs., not including engine or tender, up a grade of 18.4 feet per mile. The train had a strong head wind against it during the whole trip, which owing to its length, 1206 feet, was sensibly felt at some exposed points of the road, and must have proportionably affected the power of the engine.

Weight and dimensions of the engine, "Gowan and Marx."—Weight

when empty 21,640 lbs. In running order, with fuel and water, 24,660 lbs., on four driving wheels in running order, or with water, fuel and two men, 18,260 lbs. Cylinders $12\frac{3}{4}$ by 16 inch stroke; 8 wheels, 4 of which are driving wheels, coupled, 3 feet 4 inches diameter; truck wheels 2 feet 6 inches diameter.

The weight of the burden cars averaged from 1.5 to 1.65 tons, of 2240 lbs. each; they were all 4 wheeled—wheels 3 feet diameter, and 4 feet 6 inches apart from centre to centre.

The above performance of an $1\frac{1}{4}$ ton engine, is believed to exceed any on record in this or any other country.

G. N. Nicolls,
Superintendant transportation, Philad. and Reading R. R.

Reading, Feb. 24, 1840.

English Engines.—We find the following performance in a late English paper:—

"*A long train.*—On Sunday morning last sixty-two carriages, containing 3200 passengers, and drawn by *four engines*, left the Leeds station for Sheffiield, and who returned again the same day—a distance of about 68 miles. This exceeds the other famous train which left Nottingham, a few days before, for Leicester, and which consisted of 57 carriages and nearly 3000 passengers, drawn by four engines."

How does this compare with the load drawn by *the American* engine on the Philadelphia and Reading railroad, at the rate of 10 miles per hour, allowing 150 pounds as the average rate of each passenger. One of Eastwick & Harrison's engines drew after it on the 20th of Feb. last, in a train of 101 cars, 423 tons gross, or $268\frac{1}{2}$ tons nett, at 2240 lbs to the ton, equal to 611,520 lbs. or 4,076 passengers.

On the *Boston and Worcester* railroad, where there are grades exceeding 30 feet to the mile, we find that one of Norris' engines drew the enormous load of 150 tons nett, equal to 2000 passengers.

Western Railroad.—England.—We perceive that this road has been in partial operation for two years and three months. During this period, the locomotive engines have traversed 29,000,000 of miles, and have carried 1,520,000 passengers, without a single accident. This road has a width of track of seven feet.

Railroads in the United States.—By Chevalier De Gerstner.

(Continued from p. 281.)

Railroads in Virginia, North Carolina, South Carolina, Georgia, and Florida.

The railroads in these States are nearly all of a light and cheap construction. They traverse sections of country only very thinly settled yet, and therefore command a very small traffic in the transportation of passengers as well as merchandise. It is, however, a particular advantage to these railroads that they form a better system than those in the other States, being nearly all connected together, and forming a great thoroughfare through a large portion of the Union; wherefore they are used by the

travellers from the north and north-west to the south and south-west, as also for the conveyance of the great southern mail. A continuous uninterrupted line of railroad, now exists from Fredericksburg in Virginia, to Wilmington, North Carolina, in the one, and to Raleigh, North Carolina, in the other direction; the former having a length of 304, the latter of 227½ miles. Within a short period, other lines of similar length will be completed.

The *railroads in Virginia* have all wooden superstructures with flat iron bars of small dimensions (generally ½ inch in thickness.) Their grades, however, are very moderate, the country being favorable for their location. The State government has taken an active part in the promotion of railroads in Virginia, by subscribing for two-fifths of the stock of all works, as soon as the other three-fifths were subscribed by private individuals.

The State of *North Carolina* has now two extensive railroads in operation, one of which forms the longest line of railroad as yet completed by a single company in the United States. The same railroad has an uninterrupted straight line of 47 miles in length. The width of track of the railroads in this State, as well as in the State of Virginia, is 4 feet 8½ inches.

South Carolina was in possession of one of the earliest railroads in America; but although this was completed in 1833, no other railroad has been undertaken, except the branch to Columbia, which forms the first section of the intended Louisville, Cinninnati and Charleston railroad.

The *Railroads in Georgia*, though but lately commenced, are beginning to class among the most extensive and important. When completed they will form a system by which the whole State must be benefited. One railroad is constructed by the State, the other lines were undertaken by private companies, to whom banking privileges are granted, in order better to enable them to raise the necessary capital, as also to realize a larger profit by the assistance of banking operations. The railroads are substantially built, partly with plate rails, and partly with heavy T rail.

The *Teritory of Florida*, with its small population, is not devoid of railroads; they are confined, however, to the western section of the country, where now three railroads with an aggregate length of 60 miles are in operation. They were constructed by private companies. A fourth railroad extending into the State of Alabama, has been commenced, but the works on it are at present suspended.

The railroads in Georgia, South Carolina and Florida, have all a clear width of track of five feet.

The following list of the railroads in the five States enumerated, has been compiled from data collacted during the summer of 1839. Corrections have been made concerning those works which have since been progressing, so that this table represents the different works in the state they were in at the close of the year 1839.

The number of locomotives in use upon 994 miles of railroads is only 102, being at an average one locomotive engine for every 9¾ miles of railroad, a circumstance which serves to indicate comparatively small trafic upon these roads. But the last column in this table at the same time shows that the cost of the construction of these railroads is samller in proportion, so that a moderate income will suffice to give a good interest on the capital invested. It must also be remarked that the charges for transportation are higher in the southern than in the northern States.

The average cost per mile of all the 23 railroads when completed, will be $15,644, according to the estimates of the Engineers, which in some cases may be exceeded; but even if a sufficient allowance be made for this, the average cost per mile will not rise over $16,000.

RAILROADS COMPLETED AND IN PROGRESS IN VIRGINIA, NORTH AND SOUTH CAROLINA, GEORGIA AND FLORIDA.

No.	Name of railroad.	From and to where.	Opened.		No. of miles.		Total length of road.	Weight or dimensions of iron rails or bars	Motive power used.	Amount of capital already expended.	Amount wanted for completion	Total cost of road.	Cost per mile.
			Year.	Miles.	Besides graded.	Not yet constr'd.							
1	Richmond, Fredericksburg, and Potomac,	Richmond to Fredericksburg and the Potomac.	1837	61½		14	75½	plates 2¼ × ½	12 locomot's	1.200.000	250.000	1.450.000	19.205
2	Richmond & Petersburg,	Richmond to Petersburg,	1838	22½			22½	" 2 × ½	5 "	700.000		700.000	31.111
3	Louisa,	Richmond, Fredericksburg, & Potom'c r. r. to Gordonsv'le.	1838	35	14		49	" 2¼ × ⅝	*	415.000		415.000	8.470
4	Richmond & Coal Mines	Richmond to the Mines.		12			12	" 2 × ½	*	100.000		100.000	8.333
5	Chesterfield,	Manchester to Coal Mines.	1831	13			13	" 2 × ½	horses	200.000		200.000	15.385
6	Petersburg & Roanoke.	Petersburg to Blakeley.	1833	60			60	" 2 × ½	12 locomot's	766.000		766.000	12.767
7	City Point,	Petersburg to City Point.	1838	9			9	" 2 × ½	1 "	210.000		210.000	23.333
8	Greensville & Roanoke,	Petersburg and Roanoke R. R. to Gaston.	1838	17⅔			17⅔	" 2 × ½	*	260.000		260.000	14.717
9	Portsmouth & Roanoke,	Portsmouth to Weldon.	1837	78⅓			78⅓	" 2¼ × ½	7 locomot's	850.000		850.000	10.851
10	Winchester & Potomac,	Winchester to Harpers Ferry.	1836	32			32	" 2 × ½	5 "	500.000		500.000	15.625
1	Experimental,	Raleigh to Stone Quarries.	1833	1½			1½	" 1 × ¼	horses	3.600		3.600	2.400
2	Raleigh & Gaston,	Raleigh to Gaston.	1840	84½†			84½	" 2 × ½	*	1.360.000		1.360.000	16.095
3	Wilmington & Raleigh,	Wilmington to Weldon.	1840	161†			161	" 2 × ⅝	11 locomot's	1.800.000		1.800.000	11.186
1	Charleston & Hamburg	Charleston to Hamburg.	1833	136			136	25½ lbs.	27 "	2.400.000		2.400.000	17.647
2	Louisville, Cincinnati, & Charleston,	Branchville to Columbia.			50	16	66	56 lbs.		800.000	800.000	1.600.000	23.880
1	Georgia,	Augusta to Madison and branches.	1839	87½	70	54	211½	2.4 × 0.8, 46 lb	10 "	2.178.000	1.000.000	3.178.000	15.026
2	Central,	Savannah to Macon.	1840	100†	30	63	193	2½ × ¾ & 32 lbs.	4 "	1.280.000	1.020.000	2.300.000	11.917

* The locomotive engines used upon these railroads belong to other companies, with whom agreements were made for the purpose.
† These distances stated as opened, were completed early in 1840.

RAILROADS IN VIRGINIA, NORTH AND SOUTH CAROLINA, GEORGIA AND FLORIDA.—Concluded.

No.	Name of Railroad.	From and to where.	Opened. Year.	Opened. Miles.	No. of miles. Besides graded.	No. of miles. Not yet constr'd.	Total length of road.	Weight or dimensions of iron rails or bars	Motive power used.	Amount of capital already expended	Amount wanted for completion.	Total cost of road.	Cost per mile.
3	Monroe,	Macon to Weston and Atlantic R. R.	1839	24	20	52	96	$2\frac{1}{4} \times \frac{5}{8}$	3 locomot's	600.000	900.000	1.500.000	15.625
4	Western and Atlantic.	Decatur to Ross' Landing.			100	40	140			1.400.000	1.400.000	2.800.000	20.000
1	Tallahassee,	Tallahassee to St. Marks and Port Leon.	1837	22	2		24	$2\frac{1}{4} \times \frac{1}{2}$	2 "	200.000		200.000	8.333
2	St. Joseph and Lake Wimico,	St. Joseph to Bayou Columbus.	1836	8			8	$2\frac{1}{4} \times \frac{1}{2}$	2 "	120.000 500.000		120.000 500.000	15.000 17.544
3	St Joseph and Iola,	St. Joseph to Iola.	1839	$28\frac{1}{2}$			$28\frac{1}{2}$	$2\frac{1}{2} \times \frac{3}{4}$	1 "				
4	Alabama, Florida & Ga.	Pensacola to Montgomery.‡			15	$141\frac{1}{2}$	1 $56\frac{1}{2}$	$2\frac{1}{2} \times \frac{3}{4}$	2 "	600.000	2.400.000	3.000.000	19.169
				994	301	$380\frac{1}{2}$	$1675\frac{1}{2}$		104 loc'ts	18.442.000	7.770.000	26.212.000	15.644

‡ Only about 40 miles of this railroad are in Florida, the remainder in Alabama.

From this statement the following table is extracted, showing the number of miles of railroads undertaken and completed, as also the capital expended, and the whole cost of the railroads in each of the five States.

Name of State.	No. of railroads.	No. miles in operation.	Total length of roads.	No. of locomotives	Amount of capital expended.	Am't necessary for completion.	Total cost of railroads.	Average cost per mile.
Virginia,	10	369	341	42	$5.201.000	250.000	$5.451.000	$14.772
North Caroltna,	3	247	247	11	3.163.000		3.163.000	12.806
South Carolina,	2	202	136	27	3.200.000	800.000	4.000.000	19.802
Georgia,	4	$640\frac{1}{2}$	$211\frac{1}{2}$	17	5.458.000	4.320.000	9.778.000	15.266
Florida Territory,	4	217	$58\frac{1}{2}$	5	1.420.000	2.400.000	3.820.000	17.604
	23	$1.675\frac{1}{2}$	994	102	$18.442.000	$7.770.000	$26.212.000	15.644

ON THE EFFECTIVE POWER OF THE HIGH PRESSURE EXPANSIVE CONDENSING ENGINES IN USE AT SOME OF THE CORNISH MINES. By Thomas Wicksteed, *M. Inst. C. E.*

I am induced to address you again* upon the subject of the engines used in the mines in Cornwall, from the very kind manner in which you received my last paper.

I have been lately into Cornwall, having been instructed by the directors of the East London water works company to proceed there for the purpose of examining an engine that was to be disposed of by the East Cornwall silver mining company, with a view of purchasing it for the company's works at Old Ford. The result was, that the engine, whose cylinder was 80 inches in diameter, was purchased, and is now being removed to London, and I expect that by this time next year, it will be at work here.

While in Cornwall, I was very desirous of making such a trial of one of the engines as might be satisfactory to the London engineers, and trust that I have succeeded in my object.

I received permission to make a trial of the engine upon the Holmbush mines near Callington, and beg to give you the following detailed account thereof.

The diameter of the cylinder was fifty inches; the sizes of the pumps or "boxes" as they are termed in Cornwall, and the height of the lifts are as follows: viz.

	Fath.	ft.	in.		
Tye lift.	42	2	6	Diameter of pump,	11 inches.
Rose lift,	37	5	6	Ditto.	11 "
Bottom lift,	8	5	6	Ditto.	10 "

The chief points to which my attention was directed, were the quantity of coals consumed, and the actual quantity of water lifted.

I saw 94 lbs. (a Cornish bushel) of coals weighed, and had the stoke hole cleared, and the coal bins and stoke hole doors sealed; and in addition to these precautions, besides my own observation, I had one of my young men stationed in the boiler-house during the time of trial, so that I am quite satisfied that no more than 94 lbs. coals were used.

Before the trial I ascertained exactly the length of the pump stroke, which was eight feet one inch, and caused the engine to work slowly that I might have sufficient time to measure the quantity of water delivered per stroke. The water was delivered into a wooden cistern, with a valve to let the water out when I had measured it. Finding that six separate measurements produced as nearly as possible the same result, the greatest variation being 2 per cent., I then weighed the quantity of water delivered by each stroke, and found it to be equal to 285 $\frac{6}{10}$ lbs. I had a rod made the exact length of the stroke, namely, 8 feet 1 inch, and during the trial measured the stroke frequently; it varied from 8 feet 1 inch to 8 feet 2 inches. I have in my calculations taken the shortest length.

The diameters of the pumps, and the exact heights of the lifts, were taken very carefully.

TRIAL.

The fire under the boiler was worked down as low as could be without stopping the engine. The pressure of steam was 40 lbs. per square inch *in the boiler*, I took the counter and the time, and then started the engine. At the end of 2¼ hours the fire was lowering, and the speed of the engine reducing, and it was necessary to have more fuel. The 94 lbs. of coal having been consumed, the engine was then stopped, and the coun-

* For previous communication see vol. 1, of Transactions, as published in this Journal.

ter again taken. It had made 672 strokes, or very nearly 5 strokes per minute. The weight of water raised was (285.6 lbs. × 672 strokes =) 191,-833.2 lbs.; the height to which it was raised (was 42 fath. 2 ft. 6 in. + 37 fath. 5 ft. 6 in. + 8 fath. 5 ft. 6 in. =) 535 ft. 6 in. the weight multiplied by the height in feet is equal to 102,721,323 lbs. of water lifted one foot high with 94 lbs of coals.

This result, however, although it shows how much water was actually raised to the surface, does not show the duty of the engine, for although, in consequence of leaks and defective valves the quantity raised is not so great as it would be were it possible to have every part perfect, nevertheless, the engine has to raise the quantity due to the areas of the pumps, multiplied by the length of the stroke, under the pressure due to to the columns of water equal in height to the lifts, notwithstanding that in consequence of the defects mentioned, the whole quantity may not reach the surface; the fair mode, therefore, of calculating the duty of the engine, during the trial, would be as follows :—

	lbs.
Weight of column of water 11 inches diameter, and 42 fath. 2 ft. 6 in., or 254.5 feet in height,	10,498
Ditto. Ditto. 11 inches diameter, and 37 fath. 5 ft. 6 in., or 227.5 feet in height	9,384
Ditto. Ditto. 10 inches diameter, and 8 fath. 5 ft. 6 in., or 53.5 feet in height,	1,824
Load upon engine,	21,706

21,706 × 672 strokes × stroke $8\frac{1}{12}$ feet = 117,906,992 lbs. weight lifted one foot high with 94 lbs. coals.

From the foregoing it will be seen that 191,823 lbs. of water, were raised 535 feet 6 inches high with the expenditure of 94 lbs. of coals and that the duty of the engine was equal to nearly 118 millions of pounds raised one foot high. I should observe, that the engine had not been overhauled, or any thing done to it to prepare for the trial, which was not determined upon (as regarded the engine upon which the trial was to be made,) until the previous day. The boiler and flues had not been cleaned for eleven months. My object was to prove what could be done by an engine worked upon the expansive principle, and I therefore considered that a trial for two hours would prove the capability of the engine, although, most probably, the average duty of the engine for twelve months would not be so great as it was for the short time that it was under trial. I am perfectly satisfied the trial was a fair one.

I was not able to ascertain what the pressure of steam was when it first entered the cylinder, having no indicator with me; but the engineer, Mr. West, stated that the steam was wire drawn and reduced from 40 lbs. above the atmosphere, which was the pressure in the boiler, to 30 lbs. above the atmosphere upon entering the cylinder.

The steam was cut off at one-sixth the stroke. The steam in the jacket round the cylinder communicates directly with the boiler, and radiation is completely prevented, by the casing round the jacket; consequently a high temperature is preserved, which is absolutely necessary to obtain the full effect from the expansive force of the steam.

The following will show what effect could have been produced by the steam power, provided the engine and pump gear had worked *without* friction.

Pressure of steam when first admitted into the cylinder (30 lbs. + 14.75 lbs.—1.5 lbs. deducted for imperfect vacuum) = 43.25 lbs.

		lbs.
For $\frac{1}{6}$ of the stroke, the pressure was		43.250 per square inch.
When the piston had made $\frac{2}{6}$ of its stroke the pressure was reduced to		21.625
Ditto.	$\frac{3}{6}$	14.416
Ditto.	$\frac{4}{6}$	10.812
Ditto.	$\frac{5}{6}$	8.650
Ditto.	$\frac{6}{6}$	7.208
		6)105.961
Mean pressure of steam		17.66 lbs.

The area of cylinder was	1963.5 square inches.
Mean pressure of steam per square inch,	17.66 lbs.
Number of strokes,	672
Length of stroke in cylinder (being one foot longer than in shaft)	9 ft. 1 in.

Power of steam 1963.5 sq. in. × 17.66 lbs. per sq. in. × 672 strokes × $9\frac{1}{12}$, length of stroke, =211,658,702 lbs. raised 1 foot high with 94 lbs. of coals; now as the effect produced was 117,906,92, the friction of the machinery was eqnal to 93,751,710 lbs. raised 1 foot high, or about $7\frac{3}{4}$ lbs. pressure per square inch. As the friction of a water-works pumping engine is about $5\frac{3}{4}$ lbs. per square inch, it may be safely inferred, that an engine when working upon the expansive principle at a water-works will do more work than it does in the mines; to those who have seen the heavy pump rods, balance bobs, &c., attached to a mining engine, it will appear very evident.

In the observations I have had opportunities of making, I am very well satisfied that the engine I am about to erect at the East London water works will do a duty equal to at least 120 millions.

As it had been observed that the expansive principle would not answer for rotary or double engines, I was induced to make some observations upon a double engine working the stamps for breaking the copper ores at the Tincroft mines, and I beg leave to give you the details.

The diameter of cylinder,	36 inches
Length of stroke,	9 feet.
Length of crank,	3 feet 6 inches.
Steam was cut off in down stroke at	$\frac{1}{5}$ths.
Ditto up stroke at	$\frac{1}{3}$rd.
Number of strokes per minute,	10

The engine worked with a very equal velocity, in fact there appeared no irregularity whatever in the motion; Captain Paul, the agent of the mine allowed me to examine the coal accounts, from which it appeared, that the average consumption of coals for the engine was 30 bushel for 24 hours.

The engine was working—1st, a set of stamps: 2d, a pump; 3rd a crushing machine; and 4th, a trunking machine. The last two pieces of machinery had lately been added, and previous to this increase of machinery, it appeared from the books, that the consumption of coals was equal to 27 bushels, of 93 lbs. each, in 24 hours.

The stamping machinery worked 48 lifters; to ascertain the weight of them, I examined an account showing the weight of 26 of the cast iron heads when new, and found the average weight to be 3 cwt. 12 lbs. each, these are used until the weight by wear is reduced to 1 cwt. 2 qrs., the average weight will therefore be (3 cwt. 12 lbs. + 1 cwt. 2 qrs. ÷ 2 =)

2 cwt. 1 qr. 6 lbs. The weight of the wood work of the lifter, the iron straps, washers, etc., I found by trial to be 1 cwt. 3 qrs. 24 lbs., making the total average weight of the lifter and head (2 cwt. 1 qr. 6 lbs.+1 cwt. 3 qrs. 24 lbs.=) 4 cwt. 1 qr. 2 lbs. or 478 lbs. The average height the stamps were lifted was 10 inches, and the 48 stamps were lifted 5 times per stroke.

The following calculations will show the duty performed by the stamping engine.

48 lifters × 478 lbs. × 0.833 feet, height lifted, × 5 times per stroke × 10 strokes per minute, × 60 minutes per hour, × 24 hours per diem, 1,376,089,-344 lbs. lifted one foot high in 24 hours.

The diameter of the pump was	14 inches, or 1.069 sq. ft. area
Length of stroke,	6 feet.
Stoke per minute.	10
Lift,	26 feet.

Duty performed 1.069 sq. ft. × 6 ft. × 62½ lbs. per cubic ft., × 26 ft. lift × 10 strokes per minute, × 60 minutes × 24 hours = 150,087,600 lbs. raised one foot high in the 24 hours.

DUTY OF ENGINE.

1,376,089,344 + 150,087,600 ÷ 27 bushels = 56,525,072 lbs. lifted one foot high, with a bushel or 93 lbs. of coals.

The single engine at the Holmbush mine, was, during the time of my experiment, doing the work of 26.48 horses; thus the experiment lasted 2¼ hours, or 135 minutes × 33,000 lbs., lifted 1 foot = 4,355,000 lbs., which would be lifted 1 foot high by the exertion of 1 horse's power in 2¼ hours. 117,906,932 lbs., ÷ 4,455,000 = 26.48 horses' power. The coals consumed were equal to 94 lbs. or (94 lbs. ÷ 26.48 horses' power ÷ 2.25 hours) = 1.57 lbs. of coals per horse's power per hour. The coals used by one of the pumping engines at Old Ford in an experiment lasting 1 hour, tried upon the 18th of February 1835, were equal to 4.82 lbs. per hour, per horse's power, or three times the consumption of the Cornish engine, notwithstanding the extra friction in a mining engine.

The double engine at the Tincroft mines was doing the work of 32.11 horses; thus 33,000 × 60 minutes × 24 hours = 47,520,000 lbs. lifted 1 foot high by the exertion of one horse's power during 24 hours. The engine lifted 1,526,176,944 lbs. 1 foot high in the 24 hours; 1,526,17,6944 ÷ 47,520,000 = 32.11 horses' power. The coals consumed were 27 bushels of 93 lbs. each, or 2511 lbs. ÷ 24 = 104.62 lbs. per hour ÷ 32.11 horses' power = 3.25 lbs. of coals per hour per horse's power.

Mr. Farey, in his valuable treatise on the steam engine, states at page 488, that a rotary or double engine of Bolton and Watt's construction, will require 10½ lbs. of coals per hour per horse's power, or three times the consumption of the Tincroft double engine.

The following tables may prove interesting; the first is a chronological table exhibiting the gradual improvement of the steam engine in the course of 66 years; (the first dates and quantities have been given to me by Mr. John Taylor;) the second exhibits the average duty performed by the engines in Cornwall in 1835 and 1836, including old and new engines and all sizes.

Mr. John Taylor, an authority that cannot be disputed, stated, in a lecture delivered by him to the members of the Society of Arts, that in 1829 he procured authentic accounts, from the consolidated mines, of coals purchased and used in 1799 and also in 1828; from Wheal Alfred mines of the coals purchased and used in 1816 and in 1825; from Wheal Towan mines of the coals purchased in 1814 and 1826; from Dolcoath mines of

the coals purchased and used in 1807 and 1817; and the result of his calculations, when comparing the depth of the mines at the different periods, the water raised, and the coals consumed showed, a saving upon the books of the mines proportionate to the improvements stated to have been made during these periods in the working of the engines.

TABLE NO. I.

Date.	lbs. raised one foot high, with the consumption of one bushel or 94 lbs. of coals.	lbs. of coal per hour per horse's power.
1769	5,590,000	33.33
1772	9,450,000	19.70
1786 to 1800	20,000,000	9.30
1813	28,000,000	6.64
1814	34,000,000	5.47
1815	50,000,000	3.72
1825	54,000,000	3.44
1827	62,000,000	3
1828	80,000,000	2.32
1834	90,000,000	2.06
1837	97,000,000	1.91
Trial of Fowey Consols engine in 1835	125,000,000	1.43

TABLE NO. II.

Average duty of Cornish engines, according to Capt. Lean's Reports, 1835'6

No of engines.	Diam. of cylinder inches.	Average duty or lbs. raised 1 foot high with 94 lbs. of coals.	Average load on piston in lbs. per sq. inch.	Average No. of strokes per minute.	Highest duty or lbs. raised 1 foot high with 94 lbs. of coals.	Lowest duty or lbs. raised 1 foot high with 94 lbs. of coals.	Time of working, in months.
4	90	47,829,830	8.971	6.707	61,884,427	35,775,624	22
3	85	71,146,686	11.643	5.761	77,311,413	63,172,606	17
7	80	66,044,570	10.989	5.351	97,595,571	37,059,128	18
2	76	47,685,167	12.594	5.071	65,345,407	40,457,463	22
5	70	52,009,587	9.672	5.416	81,026,642	22,313,025	20
3	66	49,734,514	7.965	5.379	77,446,214	24,277,768	20
2	65	54,921,572	14.57	3.098	63,411,060	43,126,101	22
1	64	50,197,225	10.74	5.83	39,625,677	19,344,343	17
6	60	48,656,046	10.819	5.73	76,673,995	29,233,376	18
1	58	61,317,268	12.29	.945	67,115,413	55,366,495	12
1	56	38,059,440	12.826	3.452	46,509,910	30,656,541	8
1	53	44,468,465	16.	2.895	58,624,253	40,294,578	6
6	50	43,645,480	9.898	5.075	60,723,738	31,587,345	18
1	45	48,137,083	18.35	6.137	55,564,549	41,268,911	8
1	42	40,712,991	16.199	8.667	46,132,677	36,499.814	23
1	41	49,052,474	16.228	5.884	57,288,816	42,081,037	22
6	40	45,591,848	11.196	5.356	64,400,208	24,962.485	12
1	39	31,286,192	11.451	3.13	39,427,731	25,395,105	23
9	36	33,277,832	12 781	6.357	47,884,690	17,619,529	13
1	33	30,245,394	15.927	6.4	36,265,146	22,938,142	23
4	30	38,828,948	13.838	7.039	74,897,208	19,344,343	17
1	26	31,529,396	17.56	8.26	34,943,591	27,697,031	14
1	25¼	28,248,292	17.6	11.555	32,431,160	20,773,914	23
3	24	35,377,387	13.682		47,101,689	20,562,859	21

I cannot conclude this paper without acknowledging the great attention I received from the intelligent engineers and captains of the mines in Cornwall, whom I found, as in my former visit, most anxious to give every facility to those parties who visit the country for the purpose of obtaining information; and notwithstanding their own thorough conviction of the advantages of the system they adopt, and of the truth of the statements made in the monthly reports, they were in every instance most desirous of removing the doubts that others might have, by permitting any trials to be made, and by most readily and openly giving any information that might be required.

THOMAS WICKSTEED.

Old Ford, August 7, 1837.

FOURTH ANNUAL REPORT OF THE PRESIDENT AND DIRECTORS TO THE STOCKHOLDERS OF THE L. C. AND C. RAILROAD COMPANY.

(Continued from p. 287.)

To those, however, who are reported as defaulters, but who are still most willing co-partners of the concern; who retain a confidence in the enterprise, and who value the interest they have in it, but who under circumstances unavoidable, and little anticipated, have not been able to meet punctually their engagements, the direction have felt under very great embarrassment how to proceed. Not insensible to the peculiar pressure of the money crisis, a pressure which strongly recommended (but for the binding obligation of engagements previously entered into by the company,) entire suspension of all work, until encouraged by more favorable times, measures of indulgence have been extended, as the advertisement of the secretary and treasurer, will show, to all those who will give their obligations by notes or bonds, where it is not convenient to pay immediately in cash; and the period of final settlement is now limited to the 15th of February next. The question is open for action on this subject, and the president and board of directors feeling sensibly the responsibilities connected with it, would refer to some declaration from the stockholders, the proceedings to be had against all those who at the time specified, may still appear as delinquents in the subscription book. It should be remembered however, that there is a class of stockholders, who embarked most liberally in the enterprise, who yielded probably to those appeals made on the occasion, and to which few were insensible; who more sanguine, and more confident possibly than others, could not forsee that reaction in the monetary affairs of the country, which has surprised every one; and who periled much, with the prospect now of losing all, who may merit some consideration. Plans have been proposed by which it was thought the measure of protection could be extended to them, and as one of these did receive the favorable consideration of both the local board of the road, and the board of directors for the bank, it is submitted, in the accompanying programme, for any action the stockholders may think proper to recommend.

It may be here stated that there are no circumstances operating more prejudicially on the value of the stock of the company, (and with its depreciation in the market is unavoidably effected both at home and abroad, the credit of the company,) than the undefined relations of the supposed stockholders, and the uncertainty *as to the number of legitimate bona fide share owners;* those who acknowledge their obligations, feel an undiminished interest in the concern, and who through good, and through evil report, are still willing to endorse or stand by it. The most important, and salutary measure of the company, would be the removing, as speedily as

possible, all doubts on this subject; and if even affected at the seeming concession of a portion of the more fortunate stockholders, they will reap the advantage in the enhanced value, which, by the diminution of the number of shares, will be given to those retained.

In pursuance of the spirit of the resolution introduced by Mr. Woodfin, the secretary and treasurer, has been instructed to keep the funds of the different states, so far as collected and reported to him, separate and distinct; appropriating to the construction of the road to Columbia, the funds only collected from the South Carolina subscribers. By resolution of the board of directors, the president of the branch of the south western railroad bank, at Knoxville, was constituted the agent of this company to receive the monies paid, and the bonds and interest thereon, of the Tennessee state subscription; and an arrangement was effected with the mother bank at Charleston, for the allowing of an annual interest on a deposite of the same at the rate of four per cent. per annum. The whole to remain as an accumulating fund, for the benefit of the road; and to be applied on its construction, when it shall be deemed advisable to commence operations within the limit of that state.

With regard to Kentucky, there has been no action on this subject. If any collections have been made from the subscribers in that state, the amount must remain unreported, in the hands of the commissioners. Mr. Woodfin's resolutions, however, were limited to the state of North Carolina, and if intended to be extended, as in justice they should, to the individuals in the other states, parties to the concern, it is incomplete, and particularly in relation to the disposition of the notes; the resolution being silent as to whether they should remain deposited with the directors in that state, or with the treasurer of the company. Without the latter, or some evidence which may be recognised by the officers of the bank as an authorised payment, or security of payment on instalments on the road, the North Carolina stockholders, with those of the other states, under a resolution of the bank, may be embarrassed in the collection of dividends on their bank stock.

A separate statement of the expenditures in each state is likewise directed to be kept, and made chargeable against the state funds respectively. As yet no expenditures have been made beyond the state of South-Carolina, but for surveys; the engineer, therefore, has been instructed to apportion accordingly, the sums expended by that department in each state, to be charged hereafter against the sections of road within the limits of the same.

The relations of mutual confidence existing between the company, and their bankers in London, and which had been temporarily interrupted, by a misunderstanding of the obligations supposed to have been imposed by the agreement made with them and our agent, as explained in the report made by Mr. King, has been restored by the polite intervention of Messrs. Baring, Brothers & Co., to whom, with the consent of both parties, the points of disagreement had been referred. Though your board has most cordially acquiesced in the opinions of that most respectable umpire yet the fact is not to be disguised, that the depreciation, at which a portion of the second million of the South Carolina loan was sold, together with the incidental expenses for negotiation, &c., must result in a loss to the company chargeable on the cost of our enterprise. As it was apparent however, that the depreciation of American stocks in the European market, and by which this company had been a sufferer, originated full as much in distrust, from the non-compliance on the part of some of the States with their obligations, as from the sudden and unexpected revulsion in trade, the earliest measures

were taken to remit from the proceeds of the Hamburg road, the amount necessary to liquidate the semi-annal interest on the bonds negotiated up to the 1st of July last; and to show, from copies of the semi-annual reports on that road transmitted, the pledge which has been made for the faithful performance, on the part of this Company, of the liabilities contracted in its behalf by the state of South Carolina. It affords us pleasure to state that this prompt action, has not been without its salutary influence; and that while Messrs. McKillop, Dent & Co., have extended every indulgence for the advances made on the drafts of this company, predicated as it appears by mistake on a deposit of state stocks, they have continued to act with liberality in not forcing sales, but in disposing of the bonds in small amounts as a demand in the market was created, and at rates which will compare with the most favored stocks of the same description in the London market. Their demand against the company is thus gradually diminishing, and as the amount of bonds in deposit, exceed even at a great depreciation, the sum for which they are in advance, there will be no necessity it is hoped for the diverting of any other fund to the extinguishment of that portion of this company's existing liabilities abroad.

The committee appointed to consider the communication of Mr. Trautwine, have stated verbally to the directors, that the action of the legislature of Tennessee, at its last session, preclude the necessity of any report on the subject referred to them. A deputation however, from Tennessee, have submitted a memorial, embracing the same objects, and which will require a response from this company at this annual meeting.

ROAD TO COLUMBIA.

The report of the resident Engineer on the operations on the road, as far as Columbia, affords the requisite information as to its progress, probable cost, &c. From the Tabular statement accompanying the Report, and which has been prepared with great care, we collect the following facts: That the entire cost of the road between Branchville and Columbia, when completed, will not fall short of the sum of $1,816,724 8.

Thus explained in detail:

Value of embankments, masonry and other work done, and materials which have been furnished and paid for,	$926,688 08	
Value of the same finished and furnished but not paid for, and held in reserve as security,	72,549 36	
Value of embankments and other work yet to be done, and materials to be furnished, iron rails, &c.	692,486 46	
Engineering instruments, office expenses, &c. paid for,	85,000 00	
Contingencies,	40,000 00	
		1,816,724 08
Leaving to be provided for,		805,036 64

In a communication published shortly after my being charged with the administration of the affairs of this Company, I assumed two millions of dollars, as the sum which it would be necessary to provide to meet all the liabilities for the construction of the road to Columbia. The resident engineer's estimate is somewhat below that amount, but as he has not included the cost of the right of way, and many other incidental expenses, which it is difficult to embrace with accuracy, even the item of contingencies, the

company will find that two millions is not too large a sum to appropriate from their capital, as the proportion necessary to complete the road as far as Columbia. The most intricate and heaviest work on the road, along the entire line from Columbia to Branchville, a distance of 66 miles, had been put under contract a year or two since. Some of these which were indefinite verbal agreements, were recently brought into written form; and no new contracts under the present administration have been entered into, but for the completion of a building, turn out, &c., necessary at the depository, at Orangeburg, and for the timber, superstructure beyond that point as far as the state road. Proposals were elicited for the supply of mudsills, cross-ties, &c., necessary for the whole distance; but as from the terms of the contracts, some of the embankments could not be completed as early as was desirable, it was deemed advisable to suspend entering into any further obligations until the state and progress of the work would warrant it. In the meanwhile measures are taking to ascertain the lowest rate at which the materials required may be obtained, and whether the road, as finished, may not be brought advantageously to our aid in diminishing their cost.

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The two last semi-annual reports, for January and July, 1840, by the president and direction of that corporation, you are respectfully referred for the most ample and satisfactory information of the state and condition of the road as far as Hamburg; and its operations for the last half year of 1839, and the first six months of the year 1840. In a brief address, hastily prepared to the stockholders of the Louisville, Cincinnati, and Charleston railroad company, on entering on the administration of its affairs, as President in March last, I estimated the probable receipts for this year on that road at $470,000, and the expenses $320,000, leaving a nett profit for twelve months of $150,000 for the half year. Mr. Tupper exhibits the actual receipts for the first six months of 1840, at $223,295 46, the expenditures at $152,213 80, and the nett income at $71,086 66, differing from the estimate only in the sum of $3,981,44. When the embarrassed state of the country is taken into consideration, the entire stagnation in all trade, domestic as well as foreign, and the almost complete suspension recently of that locomotion from north to south, as the seasons change, so peculiar to American communities, stimulated alike by commercial enterprise and social feelings, our astonishment should rather be that the results approximated so nearly to an estimate based on past prosperous events, than that they should have fallen short. The estimate, however, being for the whole year; the revival of a fall intercourse and trade, equal to that participated in the last season, of which there are encouraging indications on the commercial horizon, may yet so augment the receipts for the last six months, as to realize fully the expectations of that address. The most gratifying exhibit in the report, is that "the accounts continue to show the pleasing fact of an *increase* of *income*, while the expenses *continue* to *decrease*.

It is a subject therefore of congratulation, to report that the system of economy of expenditure which had been recommended, is now maturing as rapidly as circumstances will probably permit, and that the present direction, seconded by most willing and competent officers and agents, have in the last year's management fully realized the expectations of the investigating committee instituted by this board, in bringing down the expenses of the road a fraction below 70 per cent. of its receipts. The additional fact is presented of the annual expenses of police, and reparations having been reduced to $412 per mile, which is creditable to the activity and intelligence of the superintendant, and must stimulate him still further in the work of retrenchment, as in a previous estimate he had placed these charges at

$525 per mile, with an expression of opinion that they might be brought to $500, but probably not much lower. The annual cost of the maintenance of way in the different railroads in the United States, and in Europe, varies very much. In England and Beligium it is from 45 to 60 per cent. on the receipts, in this country the variations are greater; the expenses on the Georgia road, a railway, however, most of which is new, has not the last year equalled 40 per cent. while on many of the other roads, particularly in North Carolina and Virginia, they amount to 60 or 70, and even 80 per cent. The general average, however, was estimated by our investigating committee at 60 per cent., and if to this standard the expenditure on the Hamburg road could be brought, (of which there is every prospect,) the nett profit on the present annual receipts, without any addition, would be augmented to 9 per cent. upon the original capital, and full 6 per cent. upon the cost of the road to this company.

In the progress therefore, of a more approved system of accountability, and economy now gradually introduced, the company have every guaranty that its affairs will be administered as will best advance its interests without jeopardizing the good condition of the road, and we feel convinced that the practical and indefatigueable gentlemen who directs its concerns, will, in his further investigations and exertions, on this all important subject, review the opinions he has expressed, and arrive at the conclusion we have, that in no department may the hand of retrenchment be more *certainly, more judiciously*, or more *advantageously* applied, than on the large amount of labor nacessarily employed for the maintenance or preservation of the road. To convert labor into capital, as it is every where successfully used in the southern States, and to substitute labor *thus owned by the company*, for slave labor now hired at remunerating prices from private individuals, is an operation, so far as economy merely is consulted which cannot require exemplification.

There are about 144 laborers reported as employed in the various departments on the road, at from 15 to 16 dollars per month. The number of engines in constant use during the business season of the year are 12, requiring two firemen, involving a charge, where white men are employed, as has been the case in some instances, for 24 men, at $1 per day each. When the road to Columbia is finished, the number of hands which will be necessary to attend to reparations, service at depots, on engines, etc., cannot fall short of, and will most probably exceed 200 individuals along the line of both roads; involving a monthly expense, at present rates, for pay of $3,000 or an annual charge of $36,000; which sum alone will be equal to 8 per cent. upon the present receipts, and about 1 per cent. on the whole capital involved in the construction of the road. Whatever objections may seemingly be justly entertained, by many as to the application of black or slave labor to the mechanical operations connected with the road; even that remains a problem to be exposed to the test of further examination and experiment, before we could yield to the considerations which have influenced others to condemn it. The policy however, of substituting labor owned by the company in the ordinary work on the road, for labor hired from individuals is very different; and we are so prepossessed in its favor, that the subject, as involving an increase of capital invested, is now seriously presented to the consideration of the stockholders. As an expedient to diminish expense, and consequently in the Franklin philosophy, to increase profits, it does not require an argument; but as a measure of *permanent policy*, insuring a more certain and steady control of all in the service of the company, and thus a more regular and efficient system for the management of the road, it stands recommended by the most imposing consid-

erations. Villages of farms could be distributed at the most convenient points on the line of road; the greater comfort of the slaves and their families attended to, WHICH OWNERSHIP IS KNOWN INVARIABLY TO IMPOSE; and the labor so selected and distributed, according to the talents developed, or the ascertained qualifications of the persons, as would most certainly secure the faithful performance of that which was to be executed. Labor thus tutored, and confined to, and growing up with, and on the road, would create an identity of interest, and feeling between the slaves and the enterprise; the former seeing that on the success of the latter would depend the permanency, and greater comfort of their own situation. Slaves who are now owned by the company, are reported by the superintendants and overseers, as efficient, as faithful, and as manageable as those hired, and it is difficult to conceive the reverse, as their condition is the same, the master only being changed, and the slaves always fare best when in the service of his own master.

Economy of construction, and in the management of railways, is a subject of as much interest to the community as to the proprietors. It enables the latter, without diminishing their profits, to cheapen both the cost of transportation of merchandise and of passengers. On the latter subject there is now a feeling adverse to the increased charge on passengers between Charleston and Hamburg, authorised by an act of the South Carolina legislature, and it is very questionable how far the higher rates now exacted have contributed to an augmentation of income. The reports show 4,000 passengers less this, as compared with the previous year, and the reports on the Georgia road exhibit nearly the same deficiency. Although many causes have conspired the last year, to interrupt travelling, yet as the fact is well known that on other main avenues of communication between the south and the north, the rates have been greatly diminished; it is not so certain but that these causes, with our increased charges have had an influence in diverting travellers from the Augasta and Hamburg road in other directions. The profit of a railroad, and it is peculiar in this respect, depends much more upon the quantity of freight and travel on it, than upon the higher or lower change for transportation. This may be so excessive as to exclude both, and then it may be so low as to preclude any profit. The happy medium to accommodate, and encourage all interests, is the desideratum to be sought. To a certain extent, reduction of the cost of freight and travel, does stimulate to increase of receipts and of income. Thus it has been ascertained from calculation, that a locomotive, with power to convey 200 passengers, can traverse a railroad at the cost of $1 per mile, or half a cent to each passenger, provided the whole number could always be obtained. Two hundred passengers, therefore, at $5, or even $3 to Hamburg—one-half, or even one-third of the present charge would be more remunerating to the share owners than the present daily average of some 25 or 30 passengers at $10 each. The locomotive has to perform the trip however, daily, whether a greater or a less number of passengers offer, and thus a certain expense incurred on a doubtful result. The point on which freight and passage, however, should depress or be fixed, so as to accommodate and compensate all interests concerned, depends so much upon locality, population and other causes and circumstances, that it will require both experience and observation to ascertain the limit to which falling, the trade and travel of the country would be sufficiently stimulated so as to increase receipts without reducing income. In southern countries, scarcely populated, and where the neighborhood travelling must be limited, and cannot be greatly increased, under any circumstances, or additional inducements for travelling offered, this problem is

most difficult of solution. The present income of many of the southern roads, even at the rates complained of, is only in a few instances, greater than their expenses, and in Virginia charters have been amended, so as to allow of increased charges for freight and passage to sustain their roads.

These are intricate subjects which time and experience alone can enlighten. The community of South Carolina, however, enjoy a guaranty from all possible imposition in the fact, that the dividends on the Hamburg road, under the higher tariff of charges, are limited, and that whenever, therefore, reduction of charge for freight, or passage, will stimulate to an increase of, both it is unquestionably the interest of the company to fall in their rates, and therefore, as a subject intimately connected with the prosperity and success of the road, it will continue, as it has, to engage the attention of your direction. It is the judicious management, not ownership of property, which gives value to it, and railroad, like real estate, and the planting interests of the south cannot be found exempt from this general rule. As interests, however, in the hands of companies, and of corporations, are not, (possibly cannot) be invariably watched with that instinctive eye which individuals cast on their private concerns the greater vigilence and intelligence becomes necessary in the supervision and direction of the various departments on which devolve the management of the co-partnership. In the south, however, we have many difficulties to contend with, and to a certain extent, we must be guided by our own acquired, and cannot profit always from the experience of others at a distance. Our intentions and our modes of operating are peculiar, and therefore we cannot invariably rely on systems of police and economy, which have been most approved elsewhere, but under a different organization of society, Under every view therefore, of these important subjects, connected with the company's relation to other, as well as their own interests, we rather incline to the opinion, that the annual expenses of the road will be found susceptible of further advantageous modifications; that in none can a more favorable change be made, than in the *substitution of labor owned by the company* for labor hired, and that some reduction of the present rate for passengers on the road will be found highly advantageous to those who pay, as well as to those who receive.

The receipts for the transportation on this road exhibit an average annual increase of about 21 per cent. and which, it is believed, it will maintain for many years to come, and probably progressively improve as the roads through the interior of Georgia, and the south and west are completed. As disastrous as the last season has been to the trade of the country, the report of the agent of transportion shows an increase in both the up and down freight, with the still more important fact that an intercourse now partially commenced with Tennessee has contributed to this excess. In the report of the chief engineer on the Georgia railroad, there is a similar statement, which is encouraging, as showing that already have the citizens of Tennessee been attracted to these new southern railroad avenues, now in progress of construction to the west.

The report and income of the road, as being above 7 per cent. is based on the old capital of the South Carolina canal and railroad company of two millions of dollars, the amount which had been paid in and divided into 20,000 shares of $100 each. Of these the Louisville, Cincinnati and Charleston railroad company, have already become the purchaser of 19,877 shares, at a premium nominally of 25, but actually of but 20 per cent. As, previous to the transfer, the old direction of the company had appropriated without declaring any dividends, most of the receipts on the road to its improvement; to the purchase of property at a depreciation, and which

had greatly enhanced in value, and of motive power, and to the establishment of depots, work shops, and the purchase of machinery; the road and its appendages, were, on examination, and a just estimate, deemed intrinsically worth the par value, with the premium paid. In addition to this, the completion of the embankments which had been determined on, and which had been but partially finished on the transfer, the heavier new flange rail which had been substituted for the flat iron bar, all involved further expenditures, which became necessary to place the road in the improved condition in which it is at present, and which was demanded by the increasing trade, and travel on it.

Estimating all these expenditures therefore, as capital invested, as it was only by calls for instalments on the stockholders, that they can be finally liquidated, we assumed, in a former communication, three millions of dollars, as the capital required to pay the cost of purchase of the South Carolina canal and railroad charter and road; and to meet all the liabilities and expenditures for necessary additional improvements; and it is believed that sum will not be found more than adequate to all the objects to be accomplished.

The cost of 19,877 shares in the Hamburg road, including advances for railroad iron, etc. from the exhibit of the secretary and treasurer, is,	$2,877,534 90
Add to this the amount due the State and interest,	138,223 59
Cost of road to the L. C. & C. R. R. Company,	$3,015,758 49

(To be continued.)

THE STEAM FRIGATE.

As much desire is apparent in the city to know something definite in regard to the progress to completion of this vessel; we, with the laudible desire of allaying such curiosity, wended our way some days ago to the scene of operations, the Navy Yard. As we neared the building containing the vessel, the busy hum, and cheerful sounds of industry broke pleasantly on our ear—mixed and blended came the sounds of the grating saw, the hammer's clink, the fall of heavy timber, and the stroke of the axe, as each of the multitude engaged on the vessel, plied his separate avocation. Having entered the building we turned our admiring gaze towards the huge vessel whose enormous proportions were spread out before us. Having walked down the large space in order more fully to view her beautifully model led shape; we, mindful of the cravings of our readers, turned our attention to obtaining requisite information, and by the kindness of some of the gentlemen connected with the yard, we are enabled to lay forth the following particulars:

The frigate is built in the best and most durable manner of live oak obtained from the southern part of Georgia, and weighing 80 pounds to the square foot. The frame of the hull is supported in the strongest manner with live oak knees, etc., and in regard to bolts and fastenings of every kind, nothing but copper has been employed. She is double decked, the space between them being a little more than six feet, and in the centre of the vessel is a large space for the reception of the engines, at each end of which there is an iron plate bulk head or screen drawn completely across the vessel for the purpose (in case of a leak) of keeping the water in one part of the vessel, and also to guard against accidents from the fires of the engines. They are at this time planking the upper deck, and the whole vessel is in such a state of forwardness that (were the engine ready) she could be launched in two months. She will be rigged in the same man-

ner as a ship and will require as her complement two hundred men. Her ordnance will consist of forty-two pounders and two bombs to throw ten inch shells—and when in full sailing order her burthen will be 1700 tons. Her weight is estimated at 500 tons. She is nearly as long as the steam ship President, and one foot wider. In her hold is constructed a repository capable of containing 800 tons of anthracite coal by which the engines are to be worked. In regard to to the principal dimensions, we have obtained the following:

	ft.	in.
Length from the counter to nightheads,	228	8
Extreme length to figure head,	244	
Extreme breadth,	40	
Depth in hold,	23	6

She will be ready for caulking in a few days. Taken as a whole, this vessel is a splendid specimen of the skill of our artizans. No one should neglect to view so noble a testimony to the already high character which Philadelphia has attained for ship building.

Leaving the scene of busy industry, we wended our way to another and more noisy scene—the engine and foundry establishment of Messrs. Merrick and Towne, who are busily engaged in making the engines for the Frigate. Having obtained permission we wandered through the large establishment, which is filled with workmen, who in pursuit of their several occupations made noise enough to have awakenad the seven sleepers. In the first room we entered a number of workmen were engaged in filing and polishing various parts of the huge engines. The main centre-pin for the lever beams weighing about 500 pounds was in the process of being turned, on a very large lathe. The steam chambers, specimens of great skill in casting, being of a very intricate shape and cast in a single piece, are very nearly finished—a huge cylinder more than 6 feet in diameter and at least 12 feet high was being bored—this machine for boring is of a new construction, the body to be bored being placed upwright instead of being laid down as usual—the circle of the bore is more true, it having been found that by the old method the bore was not exactly circular. We also observed a very neat machine for making screws; all the workmen in this room were engaged on articles for the frigate, and the beautiful finish on the brass and steel work, is deserving of all praise. In the next room are a number of large forges the blast of which is derived from a large fan-wheel driven by a steam engine. A small vertical trip-hammer, capable of fagotting a bar 6 inches square, was in operation as we entered, and was rapidly reducing to shape a large mass of glowing iron.

The foundry next attracted our attention. The mould of one of the frames of the engine was very nearly ready for casting; outside the door was a frame which had been lately taken from the mould; it weighs about 12 tons, and is of a beautiful Gothic pattern. The castings which we saw are very heavy and very difficult, and the success which has attended Messrs. M. & T., in their efforts thus far, is great evidence of skill and superior workmanship; a large number of castings varying in weight from one to twelve tons are in process of finishing here.

The next place to which we bent our steps was to the boiler room, where are four large copper boilers now nearly finished. At the upper part of building one of the engines is being put up together. The following are the dimensions of some of its parts.

	ft.	in.
Diameter of cylinder,	6	4
Length of stroke,	7	

Bed plate, weight 14 tons, with channels cast on,	length,	29	2
	breadth.	7	4
Main shaft of wrought iron,	diameter,	1	5
	length,	25	8
Paddle, wheels entirely of wrought iron,	diameter,	29	8
	the bucket,	10	0

Weight of steam cylinder 8 tons, weight of bed-plate 14 tons and 36,000 pounds of metal used in the melting.

These engines are of the kind usually known as the English marine engines. The cylinders are placed vertically, with two lever beams, one on each side, working on pedestals rising from the bed-plate and connected over the cylinder with the connecting rod by side links.

The Gothic pattern which has been adopted is very handsome and appropriate. They were commenced in January of this year, and will be finished in the spring of 1841.

We view with gratified feelings these substantial monuments of the skill and industry of the mechanics of our city. Our city has long held an enviable reputation for manufactures, and each succeeding day but serves to add to it. The light of intelligence is shedding her cheering beams around our artizans, and on the daily, nay hourly improvements which they exhibit, Philadelphia builds her proud and honest fame.—*U. S. Gaz.*

THE WAR STEAMER AT BROOKLYN.

Responsive to our request, an attentive friend at the Brooklyn Navy Yard, has furnished us with some very acceptable information in relation to the war steamer now in progress at that establishment, and which will shortly be launched into her destined element.

Her length from figure head to taff rail, is	243 feet.
" On upper or main deck,	223 "
" Between the perpendiculars,	220 "
" Of keel at the bottom,	207 "
Breadth of beam over the wales,	40 "
" Outside of the wheel house,	66½ "
Depth from main or upper deck,	23½ "
Measurement as a double decker,	1700 tons.
Measurement as a single decker,	1940 "
Measurement by the same scale as the tonnage of the President is estimated,	2275 "
Diameter of the glenders,	60 inches.
Length of the stroke,	10 feet.

The engines are about 600 horse power, and space is provided in iron bunkers, to carry 800 tons of anthracite coal, which it is intended to consume.

Inclination of the engines,	25 degrees.
Diameter of paddle wheels,	28¾ feet.
Length of the paddle,	10 feet.

There are four iron plate bulkheads, to divide the ship, so as to insure greater safety in case of springing of a leak, so that although one apartment may be filled with water, the others remain free.

The steamer is the same in shape, form and finish as that in Philadelphia, with the exception of the engines, which are purely and essentially American, being on the inclined principle, and as far as they are finished, they promise to be the *ne plus ultra* of engines.

This plan for the engines has been selected with a view to testing their

applicability to naval purposes, and should it succeed as well as there is now every reason to believe, the same principle will be adopted to future war steamers.

Of the beauty of the model, and the admirable finish of the internal arrangements, I will not now speak, for, as she will soon be launched, those desirous of beholding one of the most perfect specimens of naval architecture, will doubtless visit her and judge for themselves.

It has not yet been determined what is to be the nature of her amount, but it will no doubt comprise, among other guns, at least two of the celebrated Paixham guns, for throwing hollow shot.

The decks are laid, and her hull is nearly calked, and coppered to the light water mark, so that if nothing unusual occurs, she will be launched in about four weeks.

Very many nautical and scientific gentlemen have already visited her, and unfinished as she is, she has been pronounced to be as fine a model as ever was conceived; and from the solidity and faithfulness with which she is constructed, she bids fair to stand a pretty considerable battering.

It would be hardly fair to close this brief notice of this beautiful vessel without paying to Samuel Harth, Esq., Naval contractor of the Navy Yard, who superintends the whole building, a tribute to those scientific attainments so eminently possessed by him, which have suggested and consummated some of the most important and valuable alterations and additions to the plan as originally conceived.—*Sun.*

The following is an additional proof, that moderate fares increase and extend the business, *produced by railways.*—

Liverpool and Manchester Railway.—In the appendix of the 5th report to the British Parliament, pp. 371, 372, and 373, we find the following:

	1837.	1838.
Special agreements,	18,294*l.*	31,906*l.*
Passengers and parcels,	126,287	124,193
Goods,	81,419	104,204
Total,	226,000*l.*	260,330*l.*

The passenger's fare was raised 6d. for the whole distance of 31 miles, on the 25th of November, the passengers, after this rise, fell off 1 1-2 per cent., and they also fell off the amount of annual natural increase, viz: 10 per cent. *showing a loss by the higher fare,* of 11 1-2 per cent.

It is to be remarked, by the above statistical account, that, during the very same time when the passengers thus fell off, the receipts under special agreements, (which approximate to the nature of tolls,) increased 74 per cent. and the receipts for freight increased 28 per cent.

Sunday at Versailles.—The Presse de Seine et Ooise, states that on Sunday last, when the waters played at Versailles, the officers for the distribution of tickets were quadrupled, so as to enable the railway company to give out 1000 tickets in twelve minutes. This arrangement enabled the company to send off every half hour, between six in the morning and ten at night, several trains of 25 to 32 carriages each, some of which were drawn by four engines. The service continued until midnight, but the arrangements were so complete, that their remained only a few persons to return after ten. In the course of the day 1750 carriages were sent along the line, being equal to 3500 diligences of twenty places each. To

have conveyed this number of persons, would have required 14,000 horses, estimating each horse to perform six leagues during the day.—*Galignani.*

Central Railroad.—We refer with State pride, to the progress made on this road: one in which all the citizens of Georgia, and more particularly the citizens of Savannah, are so deeply interested. Contracts for grading will be concluded at Milledgeville early next month, to the upper terminus of the road, which will be another rapid stride to its completion, and the receipts on the road thus early, should nerve all friends of internal improvement in the legislature, to battle for railroads and canals, and not permit any lukewarmness on the part of any who have heretofore voted in a cause so conducive to the glory and prosperity of the State.

The great labor that has been expended in the examinations of the country between the Oconee river and this place, has resulted in the discovery of a route of a more favorable character than could have been expected in so uneven a section of country. The total distance from the city of Savannah to the Ocmulgee river by the route of the railroad, is 190 1-4 miles, and the distance of grading remaining to be done is less than 50 miles. The road is now in regular daily operation for a distance of 122 miles, and about 200 wagons engaged in hauling freight from the depot to different parts of the State.

The business has so far during the present season, far exceeded that of the last, and there appears now to be no room for a doubt of the entire success of the enterprise, and the profitableness of the investment of capital. We also learn that the grading remaining to be done, will probably be offered for contract within a few weeks.

As it probably will be interesting to many of our readers to learn the route by which the road will enter the city, we would mention that the one first contemplated by the valley of Walnut creek, has been abandoned, and another several miles below substituted. It now descends to the Ocmulgee valley by that of Boggy branch, crosses Walnut creek in the margin of river swamp—passes to the left of the large mound, and branches just below Evan's brick yard, one line passing up, and parallel with the river, on the east side, above the bridge, the other crossing the river, and ending at the foot of Cherry street.—*Georgia Messenger.*

Baltimore and Ohio Railroad.—The directors of this company are pushing the work with great energy, and reaping a substantial reward. During the past year the gross receipts on the main trunk, of the road were $432,883, from which is to be deducted for all disbursements, $290,055, and there remains $142,828 as the nett receipts for the year.

The receipts of the Washington branch were $202,755, disbursements $123,532, leaving a balance of $79,244 as the nett income.

The extension of the road to Cumberland is rapidly progressing, 1600 men and 500 horses are now at work upon it; and it is asserted, that should their resources allow the board to procure the iron and other materials in season, to make sixty or seventy miles of railway in the course of the year 1841, and to prosecute the remaining thirty or forty miles in the spring of 1842, it will be practicable to finish the entire work, and put the road in operation to Cumberland in the summer and autumn of that year.

Western Railroad.—Below is a statement of the receipts and expenses of that portion of the Western railroad which is now open, extending from Worcester to Springfield, fifty-five miles. The results are highly satisfactory. The way travel and freight, are not only paying the expenses of the road, but already yield a handsome revenue; and when the road is opened

to Albany, and becomes, as it soon must, a thoroughfare between Boston and the great west, it is obvious that its revenue must be much increased.

Receipts for Passengers and Merchandize on the Western Railroad, Massachusetts, for six months, euding 30th September, 1840. Three trains per day, each way.

Month.	Passengers.	Freight.	Total.	Expenses.	Nett income.
April,	4,067 60	4,405 17	8,472 86	4,709 65	3,763 21
May,	5,219 60	3,198 35	8,416 95	4,609 66	3,807 29
June,	8,007 28	2,388 73	10,496 01	4,426 87	5,969 14
July,	6,987 06	2,434 04	9,422 10	3,890 95	5,531 15
August,	9,316 77	2,979 00	12,295 77	4,199 91	8,095 86
Septem.,	12,750 74	4,038 00	16,788 74	4,400 00	12,388 74
	$46.349 14	$19,442 29	$65,792 43	$26,237 04	$[illegible],555 39

Add for transportation of the mail, $2000, and we have a nett revenue of $41,555 39.

We are happy to learn that fifteen miles more of this road, viz: between Dalton and the State line, will be put in operation in the course of the next month, and that the 28 miles between Springfield and Chester will be opened early in March next. The whole line of the road from Boston to Hudson, on the Hudson river, except two miles at the summit, will no doubt be opened in July next; and, by the first of January, 1842, we expect to pass on the Western railroad from Boston to Albany.—*Boston Courier.*

This road will cost not far from $7,000,000. It is calculated to support an engine of 14 tons weight, and to carry 1000 barrels of flour in a single train of cars, 10 miles an hour. It is estimated that when finished, flour can be transported from Albany to Boston, 201 miles, for 30 cents per barrel. Two thousand men are now at work on this road, in some sections, both night and day.—*Gloucester Tel.*

Norwich and Worcester Railroad.—The receipts on this road for freight and passengers, for the last six months, being the first six months of the operation of the road, have been $77,390 74; for mails, etc., $1,933 08; making an aggregate of $97,373 82.

The friends of this enterprise anticipate that the amount of receipts on this road during the next year, will be double what they have been during the present year. The road will then have been finished, the buiness of the country will be more effective, the manufacturers on the borders of the railroad will more universally avail themselves of this new avenue.

Steamboats of a superior character will be placed on this route, one of which will be a new boat, built for the line by the present steamboat company, of 640 tons burthen, and of great speed; and in addition to this there will be the regular annual increase of business, which is *created* by a railroad found by the experience of England and this country, to 20 per cent. per annum or a doubling in five years.

We understand that the above receipts for the last six months, enable the company, after paying all expenses and interest, to divide at the rate of between five and six per cent. per annum, and as the expense will be no greater for a moderate increase of the business of the road, and as the company have permanent loans, principally at an interest of five per cent., the addition of $1000 per week, or 25 per cent. to the gross earnings, will very nearly double the amount of dividends to the stockholders.—*Ægis.*

Canal Tolls.—The amount received for tolls on the New York State canals during the second week in October, is $79,776 56.

Genessee Valley canal.—The amount received during the month of October for tolls on the navigable portion of this canal, (36 miles,) is $2,963 39. There has been shipped on the canal during the month, 141,972 bushels of wheat, and 22,444 barrels of flour. The lockages for the first lock out of Rochester, for the north, number 384; and those at the Scottsville lock, 327. The aggregate of tolls from the opening of the canal in September to the first of November, is $4,334 69.

Wabash and Erie canal.—Boats are now dispatched daily on this work, between Maumee city and Providence.

American Engines.—We are glad to learn that American mechanical genius is appreciated in England, and that for the immense amount of railroad iron which the United States has received from Great Britain, the latter country is receiving from the former, in part payment, many excellent locomotive steam engines for her own railroads. The subjoined is part of a letter from a friend in Liverpool, written on the 30th of June.

In answer to your inquiries as to the locomotive engines shipped to this country by your enterprising citizen, William Norris, under contract with some of our railroad companies, I am happy to say, that they have succeeded to admiration. Some delay arose in testing some of them, arising from the circumstance of his head engineer, or manager, on this side of the water, having on two occasions, been detained on the continent by Mr. Norris's business there, longer than he calculated on; and nothing could be done in the trials of the engines in his absence. Every thing has resulted very satisfactorily, and all his engines have been promptly paid for, except the last, which was shipped in April, and is of the largest class, which is now on trial—and his agent tells me that the trial is nearly completed to perfect satisfaction, and which the company will pay for in less than ten days. I am further informed that all of Mr. Norris's engines give very great satisfaction, and that orders have recently been sent him for four additional ones.

Anthracite Iron.—Anthracite iron is appropriately termed in the Philadelphia commercial list the second staple of Pennsylvania, the first being coal. That paper remarks, that although not one year has elapsed since it was brought into use, it has already increased with a rapidity that may fairly be taken as the harbenger of what it is destined to become in a few years. Within the brief period of nine months there have been constructed and are now in blast, three furnaces making iron of the first quality, with no other fuel than anthracite coal. They have been in blast from three to five months, and turn out from 40 to 50 tons of pig iron weekly. During this time many experiments have been made, in nearly all of which it has been satisfactorily ascertained that they can be managed and kept in order as easily as the furnaces using charcoal or coke. Two more furnaces are erected, which are to be put in blast this month. Sixteen more furnaces are already erected, or are now in progress, all of which use anthracite coal. Four large rolling mills with puddling furnaces are erected, one of which is in successful operation; and the other will soon commence manufacturing with coal as fuel. Two additional mills are to be put up this winter and next spring.

The above twenty-one furnaces and six rolling mills with their puddling furnaces will all use anthracite coal as a fuel. Thirteen of the furnaces and five of the mills are located on the line of the Lehigh and Morris canal, and will create a tonnage, including ore, coal, limestone and pig iron, of 227,500 tons, of which amount there will be 90,000 tons of coal obtained from the Lehigh mines.